DOCUMENT RESUME

ED 425 860 PS 027 235

AUTHOR Offenberg, Robert M.; Holden, Barbara
TITLE Kindergarten Enrollment Age and Achievement: Overage Enrollment.
INSTITUTION Philadelphia School District, PA. Office of Accountability and Assessment.
PUB DATE 1998-08-00
NOTE 22p.; Paper presented at the Annual Convention of the American Psychological Association (106th, San Francisco, CA, August 14-18, 1998).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Academic Achievement; *Elementary School Students; Enrollment; *Kindergarten; Kindergarten Children; Longitudinal Studies; Primary Education; *School Entrance Age

ABSTRACT

Research on the relation of age of admission to kindergarten and later school achievement has yielded inconsistent findings. This study examined the school district records of two cohorts of kindergartners who had been enrolled in the same school district during Fall 1989 and Fall 1990. Records for both cohorts were examined at the completion of second grade, and records for the 1990 cohort were further examined at the completion of sixth grade in 1997. The findings suggest that a high percentage of children who were enrolled in kindergarten after they had reached their sixth birthday and were thus age-eligible for first grade had problems that appeared before the end of second grade, and problems that were manifest 7 years later. In addition, both students who were held back and students who skipped grades were over-represented among the overage group. Overage students earned lower grades than their peers, but the distribution of scores, as reflected by standard deviation, was the same. It was concluded that when overage children are enrolled in school, exploring the reasons parents give for such enrollment may provide clues about areas in which schools need to provide support. (KB)

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KINDERGARTEN ENROLLMENT AGE AND ACHIEVEMENT:

Overage Enrollment

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Robert M. Offenberg

and

Barbara Holden

School District of Philadelphia
Accountability and Assessment

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Research on age of admission to kindergarten and later school achievement has often shown that students who begin school when they are older have an advantage. During the past year, Byrd et al. (1997) attracted attention when they examined data in a large, nationally representative sample and found that this might not be true.

We conducted a study of two cohorts, composed of all kindergarteners who had enrolled in our school district during fall 1989 and fall 1990. In response to the interest generated by Byrd et al. we extended the 1990 cohort's data through 1997, when the students should have completed sixth grade. The extended study put special emphasis on children whose parents had waited to enroll them in kindergarten until their children were old enough for first grade. Our findings suggested that a high percentage of these overage children had problems that appeared before the end of second grade, and problems that were manifest seven years later. We concluded that, when overage children are enrolled in school, an exploration of the reasons with the parents might provide clues that schools need to provide support.

In reviews of research on age of entry into kindergarten and later school achievement, researchers generally found that the older children's academic performance was better than younger children's performance (Uphoff and Gilmore, 1986; Bickel, Zigmond, and Strayhorn, 1991). Uphoff and Gilmore noted, for example, that older children were more likely to receive above average marks and were more likely to score higher on standardized achievement tests. Younger children, on the other hand, were more likely to fail a grade more frequently than older children were and to be referred for evaluation of learning disabilities. Byrd, Weitzman and Auinger (1997) suggested that this view was flawed. They analyzed a nationally representative parent sample's responses to the Behavior Problem Index, a component of the 1988 National Health Interview survey. Their analyses showed that white children who were old for their grade, but had not been retained in grade, exhibited behavior problems during the course of their school career. But this finding was not confirmed for minority groups. At times, Byrd et. al. appears to attribute the behavior problems to the experience of being older than ones peers.

In the fall 1994, we conducted a study of the relationship between children's age when they were admitted to School District of Philadelphia kindergartens and their achievement three school-years later, when they should have completed second grade. The study was for internal, school-district use, and has not been disseminated until now. Although our original focus was on children who were admitted to kindergarten when they were too young, we also noted that there were too many children who were older than expected who were having difficulty in school. Last year, our interest in children who were admitted to kindergarten when they were older than expected was renewed when Byrd et. al. received considerable attention because it appeared to support this finding. So, we reviewed the material in our 1994 study, and began to explore the status of the cohort when its members should have completed sixth grade in June 1997.

The research we began in 1994 and are now continuing is a cohort study based on school district records. This approach would, we believed, reduce the biases inherent in Byrd's using cross-sectional data to explore events which unfolded over time, and inherent in his relying on parents' recollections; but it required us to confine our conclusions to a large city school district with a substantial low-income and minority population. Since our school district records include promotion to the next grade, special education and gifted program participation, standardized test scores, and report card marks, we were able to redefine the focus from parents' reports of school behavior to indicators maintained in school records. As these indicators can reflect exceptionally good achievement as well as weaknesses, we might be able to detect trends that could partially confirm both views of the effect of kindergarten admission age.

Our 1994 study focused on two cohorts of kindergarteners when they should have reached the end of second grade. It was undertaken because the school district was contemplating changing the minimum age at which children could be admitted to kindergarten. Our second study followed one of the two cohorts to spring 1997, when its students should have completed sixth grade. Its focus was the differences among these students' achievements due to having been regular age and overage kindergarteners.

Within the School District of Philadelphia, policy was to admit pupils to kindergarten who were as young as 4 years, 7 months by September. Although kindergarten admission age has since been raised to 5 years, studying these students continues to be of interest, because it provides a wider age range than more modern cohorts would, and because it provides the opportunity to examine the cumulative effects of the years that typically define elementary education.

DESIGN

The 1994 Study. The goal of this study was to explore the relationship of kindergarten admission age to outcomes that occured three school years later, when most children completed grade 2. Because of its exploratory nature, we felt comfortable experimenting with causal models, introducing a nonlinear relationship with age (the square of age), a social class or SES indicator (an estimate of the percentage of AFDC pupils in each school) and an interaction of age and social class to improve the predictive value of some regression models.

We used the School District's computer managed data system to obtain all of the information for the study. These included data about age at admission to kindergarten, continuation in Philadelphia schools through the end of the study period, grade level and, for children in second grade, scores from the city-wide testing program, and the marks and effort ratings that appeared on June report cards. First, the relationship between two variables, age of admission to kindergarten and pupils' rate of progress through the grades, was examined. Next, the performance of pupils who were in grade 2 was related to their age at admission to kindergarten. In this part of the study, multiple regression was used to search for patterns that were strong enough and reliable enough to be considered. By comparing the outcomes for children who were admitted to kindergarten during fall 1989 with those for children admitted in fall 1990, we attempted to increase the reliability of our findings.

Although we used statistical test to identify trends worthy of attention, all the data could be considered population values. The subjects were all the children who were admitted to

kindergarten during 1989-90 and 1990-91. The children in the study were between 55 and 75 months of age when admitted to kindergarten. Pupils outside this age range were excluded because there is a high probability that their birth dates were erroneously recorded. Each year there were about 15,000 admissions. These pupils were followed for two more years, through June of the year they were expected to have completed second grade.

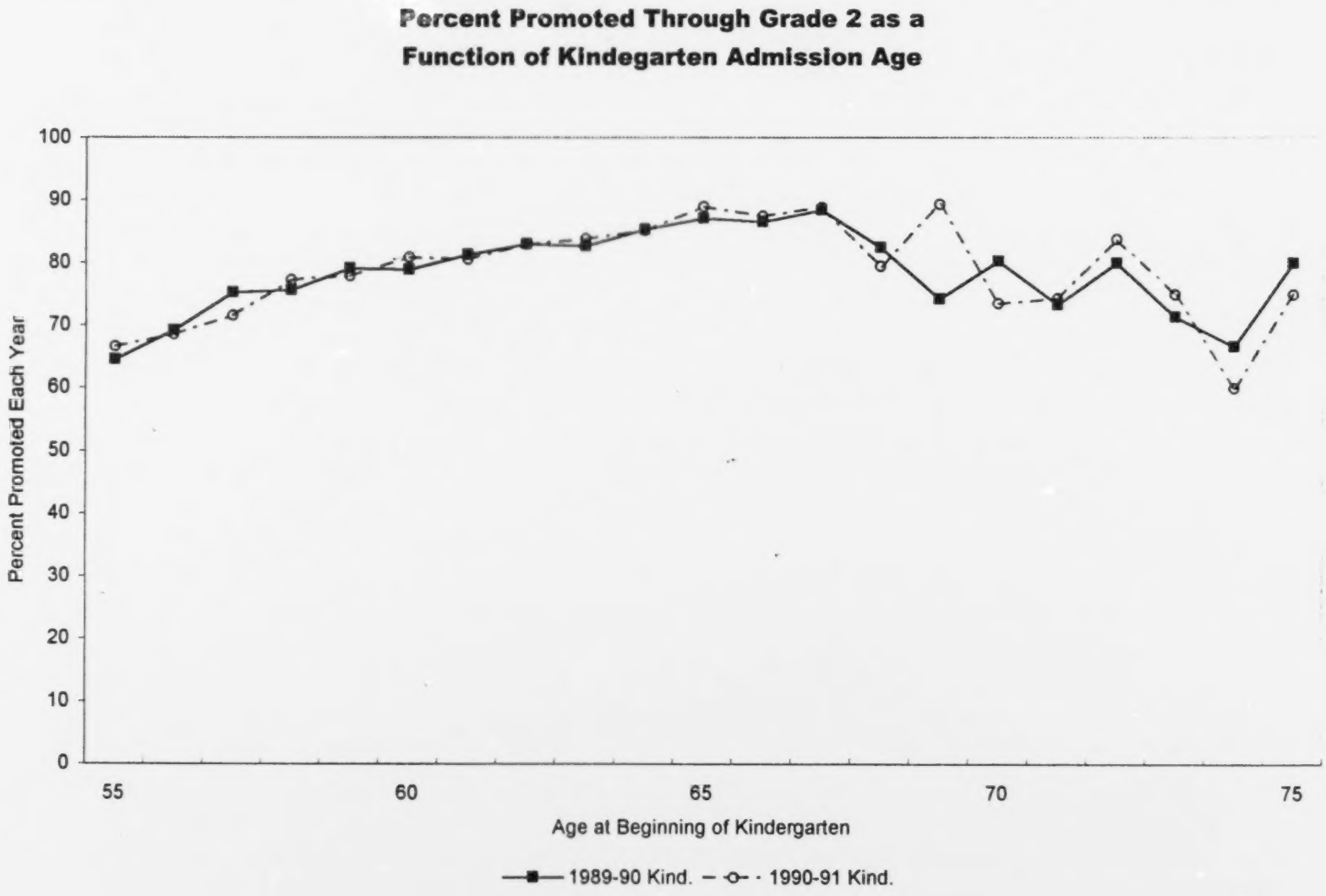
The Current Study. Our current goal is to explore the relationship of kindergarten admission age to outcomes that occurred seven school years later, when pupils should have completed grade 6. Because of the complexity of dealing with computer records created over a long period, we studied only one of the two cohorts, the pupils who began kindergarten during the 1990-91 school year. For the time being, we have kept the statistical analyses simple by using univariate statistics and defining "overage" as students who had reached their sixth birthday when they began kindergarten. Despite these limitations, we believe that we have been able to find interesting, useful information. First we found the members of the cohort who were still enrolled in the school district. Then we examined the relationship between having been an overage kindergarten pupil and three indicators of school success: the rates of children moving through the grades, participating in Special Education and Gifted programs, and earning sixth grade report card marks.

THE 1994 STUDY FINDINGS

Status of the Students during the Second School Year after Kindergarten. Between the start of kindergarten and the end of second grade, about twenty percent of the children left the school district, presumably to attend school elsewhere. About fifteen percent of the children stayed in the school district but were retained in grade, while one to two percent were enrolled in its ungraded programs. According to records, a handful of pupils were listed as still in kindergarten or a year ahead of expected, in grade 3, but the probability of these records being in error is high because retaining pupils in grade for two years and skipping grades were inconsistent with the promotion policies in effect at the time. All of the remaining pupils, 62.4% of the 1989-90 kindergartners and 63.4% of the 1990-91 kindergartners were still enrolled in the school district and completed second grade on time.

Relationship between Age and Placement at Grade Level. Figure 1 shows the percentages of the pupils who were on grade level two years after kindergarten. The percentages are based only on the children who were in grade 1 and grade 2. We deleted the children who had moved, were in ungraded classes, appeared to have skipped grades, or appeared to have been retained in grade more than once.

Figure 1


Percent Promoted Through Grade 2 as a Function of Kindegarten Admission Age
Percent Promoted Each Year
100
90
80
70
60
50
40
30
20
10
0
55
60
65
70
75
Age at Beginning of Kindergarten
1989-90 Kind.
1990-91 Kind.

The figure shows that pupils who were younger and older than the conventional kindergarten age were less likely to reach second grade on time. Only about two-thirds of the pupils who were 55 months (4 years, seven months) were still on grade level, as compared to almost nine of ten pupils between 64 and 67 months old (i.e., between 5 years, 4 months and 5 years, 7 months). Pupils who were more than 67 months tended to be less likely to be on grade level. But, because there were only a few children at each age, the trend lines shown in the graph were jagged.

Multiple regression analyses relating the pupils' being on grade level to the pupil's age and its curvilinear form (age-square) showed that the pattern was not random. However, this pattern explained less than 3% of the influences on individual pupil's being on grade level. Thus, the age trend we examined might prove to be useful for understanding factors that influence large groups of pupils, but they are not much help for predicting whether any particular child would be on grade level.

Relationship between Age and Academic Achievement. For each of the two cohorts of pupils, multiple regression models were used to explore the relationship of pupils' age upon admission to kindergarten and an indicator of SES (percent AFDC children in the pupils' kindergarten school) to six achievement variables: Grade Point Average (GPA) from the June report cards, Reading Vocabulary, Reading Comprehension, Reading Total, Mathematics Concepts and Applications, and Mathematics Computation scores from the Comprehensive Tests of Basic Skills. The analyses were based on the attainments of pupils who completed second grade on time because we wanted to include only the pupils who had taken the same standardized test levels, had been evaluated by teachers using the same report card format, and were in the grade for the first time.

The results for all of the analyses were similar. Consequently we will first discuss the explanatory power of the analyses as a group. We will then describe the results for all the pupil outcomes as a group, using the analysis with the most explanatory power to illustrate them.

Explanatory Power of Kindergarten Age and School SES. The models based on kindergarten age and the joint effect of age and SES explained small, but meaningful percentages of the variation of pupils' attainments. Depending on the outcome, the range was from 3.5% to 9.6%. This means that for every outcome we explored, over ninety percent of the differences among pupils were due to factors we did not include in the study, such as unique

characteristics of children other than age, school factors, family attitudes about school, and imperfections inherent in the testing and marking procedures.

Patterns Relating Age, AFDC Percentage and Achievement Measures. Every second-grade achievement measure we explored was related to pupils' age and SES in a pattern like the one shown by the graph in Figure 2. The graph is of the best-fitting curves computed from an analysis relating pupils' age in kindergarten, a curvilinear form of the age (age-square) and the schools' socioeconomic status indicator's effect on age (age times percent AFDC) to second grade standardized reading test scores. As this graph was based on the statistical model discussed above, it is a simplification that shows a general trend free of the effects of other pupil characteristics.

The lines on the graph represent different socioeconomic status groups. They show that within each SES group reading scores go up for children who were older, until 67 or 68 months was reached. Then the scores of even older pupils go down, until, in some SES groups, the scores of the oldest pupils were about the same as the youngest pupils' scores.

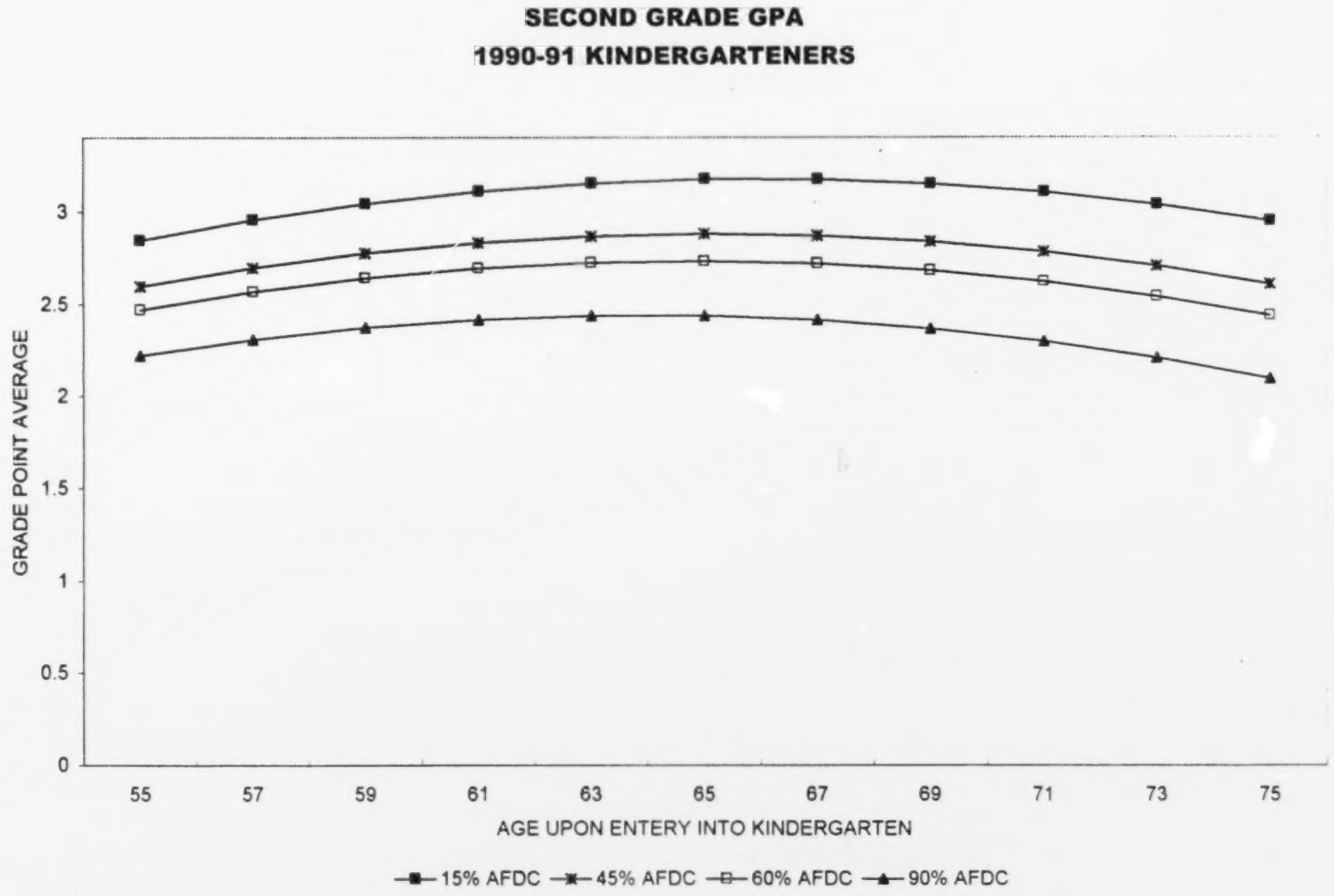
Because the analyses of achievement were restricted to children who had completed second grade on time, we may have underestimated the strength of this pattern. If it were possible to include the pupils who were retained in grade, the pattern of rising and then falling levels of achievement probably would have been stronger.

Besides the general pattern of scores rising, reaching a peak and then falling with age, the figure shows that patterns differed with SES. On the graph, the SES lines are closer together for the youngest children than they are for the oldest children. This suggested that the SES of a school made less difference for the children who started kindergarten when they were younger than it did for children who were older. The pattern was observed for every achievement measure we examined, and for both cohorts of children. Each analysis showed achievement reaching a peak for children who began kindergarten around 67 months and then declining, and each analysis showed that SES made less difference for younger children than it did for older children.

THE RECENT STUDY FINDINGS

Status of the Students Seven School Years after Enrolling Kindergarten. Over fifteen thousand children comprised the 1990-91 cohort. By spring 1997, 29% of the cohort had left the school district. The remaining 10,824 children are the subjects of this study. Within the

Figure 2


SECOND GRADE GPA
1990-91 KINDERGARTENERS
GRADE POINT AVERAGE
0
0.5
1
1.5
2
2.5
3
55
57
59
61
63
65
67
69
71
73
75
AGE UPON ENTERY INTO KINDERGARTEN
15% AFDC
45% AFDC
60% AFDC
90% AFDC

group, there were 178 children who were 6 years or older when they began kindergarten, the children we regarded as "overage."

Overage and Grade Levels. Our analysis of students' grade levels suggested that both those who believe that children's beginning kindergarten when they are older than their peers is an advantage, and those who believe it is a disadvantage are correct. For, in our cohort, both students who were held back and students who "skipped" grades are over-represented among the overage group, while students who made normal progress through the grades are under-represented.

If all children had been promoted at the end of every school year, they would have completed grade 6, but only two-thirds of the children were in that grade. One-third were below grade 6 or in ungraded classes often used with special education students, and a small number of students (.004%) had been advanced to grades 7 or 8, suggesting that they had "skipped" grades. The grade level distribution of overage students should be similar, but it was not. Nearly half (46%) of the overage group were below grade 6 or in ungraded classes, suggesting that they had serious academic difficulties. And about a tenth of the overage students were among those who had skipped grades. A Chi-square test confirmed that the differences between overage students and the rest of the cohort population were not likely to be chance.

Overage, Special Education and Gifted Programs. Our analysis of participation in special programs supported the position that overage students were more likely than regular age students to participate in a Special Education Program to address a dysfunction were. It does not support the position that overage students were more likely to participate in a Gifted Program providing enrichment.

In the cohort population, about one tenth of the students (10.1%) were in Special Education, 6.1% were in Gifted Programs. In the overage group, more than a quarter of the students (27.0%) was in Special Education. However, the percentage of overage students in Gifted Programs was only 3.4%. A Chi-square test confirmed that the differences between overage students and the rest of the cohort were not likely to be chance.

Overage and Report Card Marks. We examined report card marks of students who reached grade 6 on time in order to see whether there were long lasting effects of parents starting their children late. We hoped to be able to answer two questions. Did overage students earn the same average marks as other students in the cohort? Differences between the two groups' averages show whether parents of overage students tended to suspect that their children had

problems or attempted to give their children an edge. Were the marks of overage students more diverse than other students' marks? More diversity among overage students might mean that parents had inconsistent reasons for delaying their child's entrance into kindergarten, reasons that had long-lasting effects on achievement.

Our analyses showed that on average, overage students earned lower marks than their peers, but the distribution of scores, as reflected by the standard deviation, was the same. Together, these findings suggested that overage sixth grade students had parents who suspected problems early on.

School district enrollment records showed that there were about 6,400 students in the cohort who completed grade 6 on time and had traditional report card marks at the end of sixth grade; 84 of them overage. We computed grade point averages (GPAs) from their English/language, Mathematics, Science and Social Studies marks, giving a value of 4 to "A" and 0 to "F." The overage students' mean GPA was 2.01, compared with 2.39 for the cohort. A t-test confirmed that the difference between the overage and the other students was not chance. The overage group's and the population's standard deviations were virtually the same, about one tenth of a letter grade, with a test for equality of variance showing virtually no difference.

DISCUSSION AND CONCLUSION

In our 1994 study, we confirmed that, as children mature, they were better prepared for kindergarten and school *up to a point*. But our 1994 study and our current research both suggest that there is a kindergarten enrollment age, about six years old, where the effects of maturation are often overwhelmed by an important phenomenon, which we suspect is a parent's recognition that something is wrong about their child. Every analysis of our cohort data provided evidence that at least some causes of parents' delaying kindergarten enrollment until their child is overage can have negative consequences throughout elementary school. (One analysis also showed that more overage students skipped grades than expected. Ordinarily, a student skipping a grade, which was not school district policy, would be taken as a sign of exceptional maturity and achievement, but it may not have this meaning among overage students.)

We believe that most urban, public-school children's parents, if they are interested in having their children attend kindergarten at all, find it advantageous and probably prestigious to have their children start kindergarten when they are young. And most parents know that kindergarten for five year olds is the norm. So when a parent chooses to ignore their interest and this norm, it may be a clue that the child needs or deserves support of some type. Reviewing a child's history and exploring a parent's concerns when an overage child enrolls or begins kindergarten may be an effective way of providing timely support.

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ADDITIONAL GRAPHS FOR APA PRESENTATION

Children's Grade Levels 7 Years After Starting Kindergarten

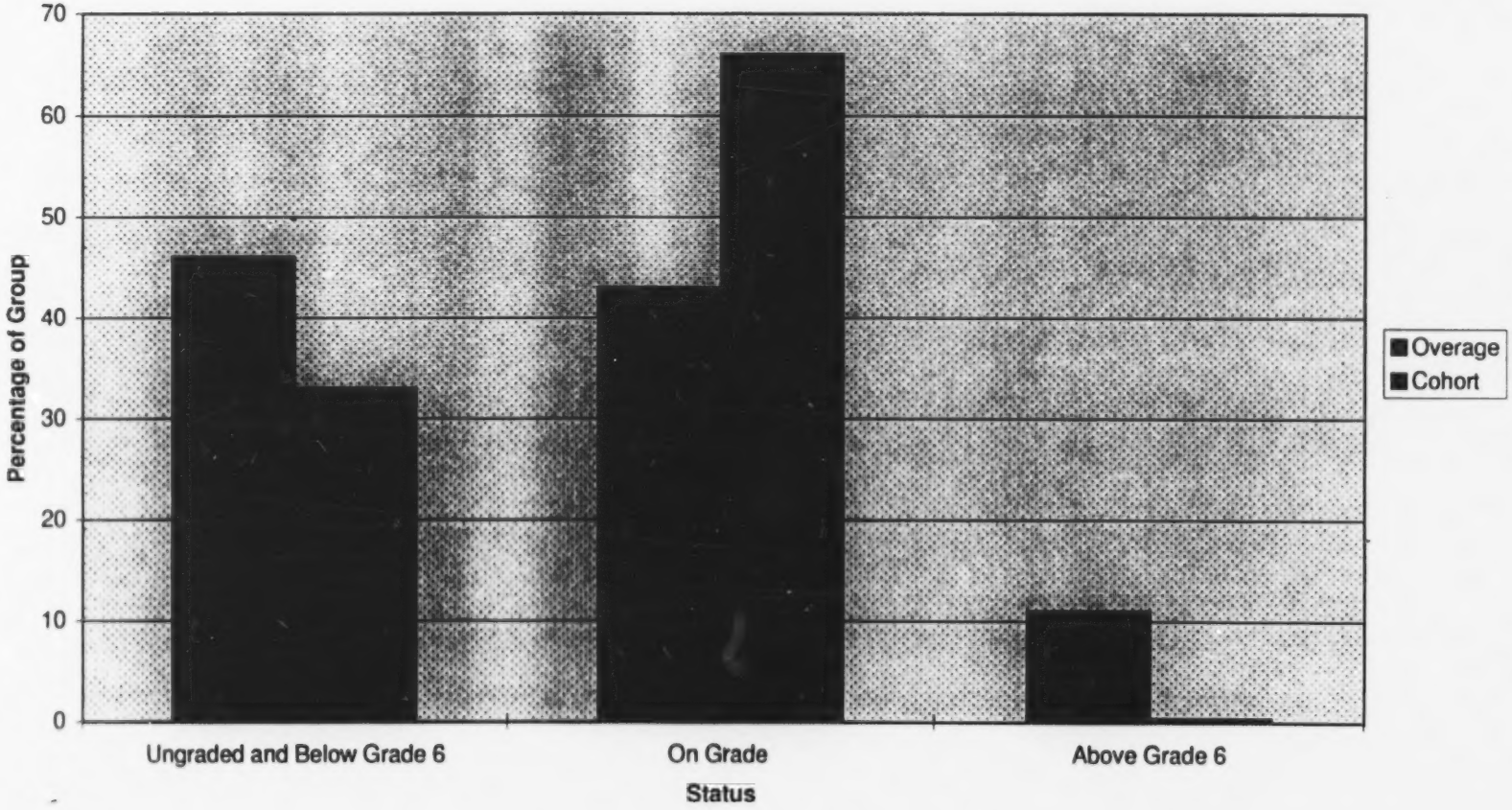

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Chart1

Special Services of Children 7 Years After Starting Kindergarten

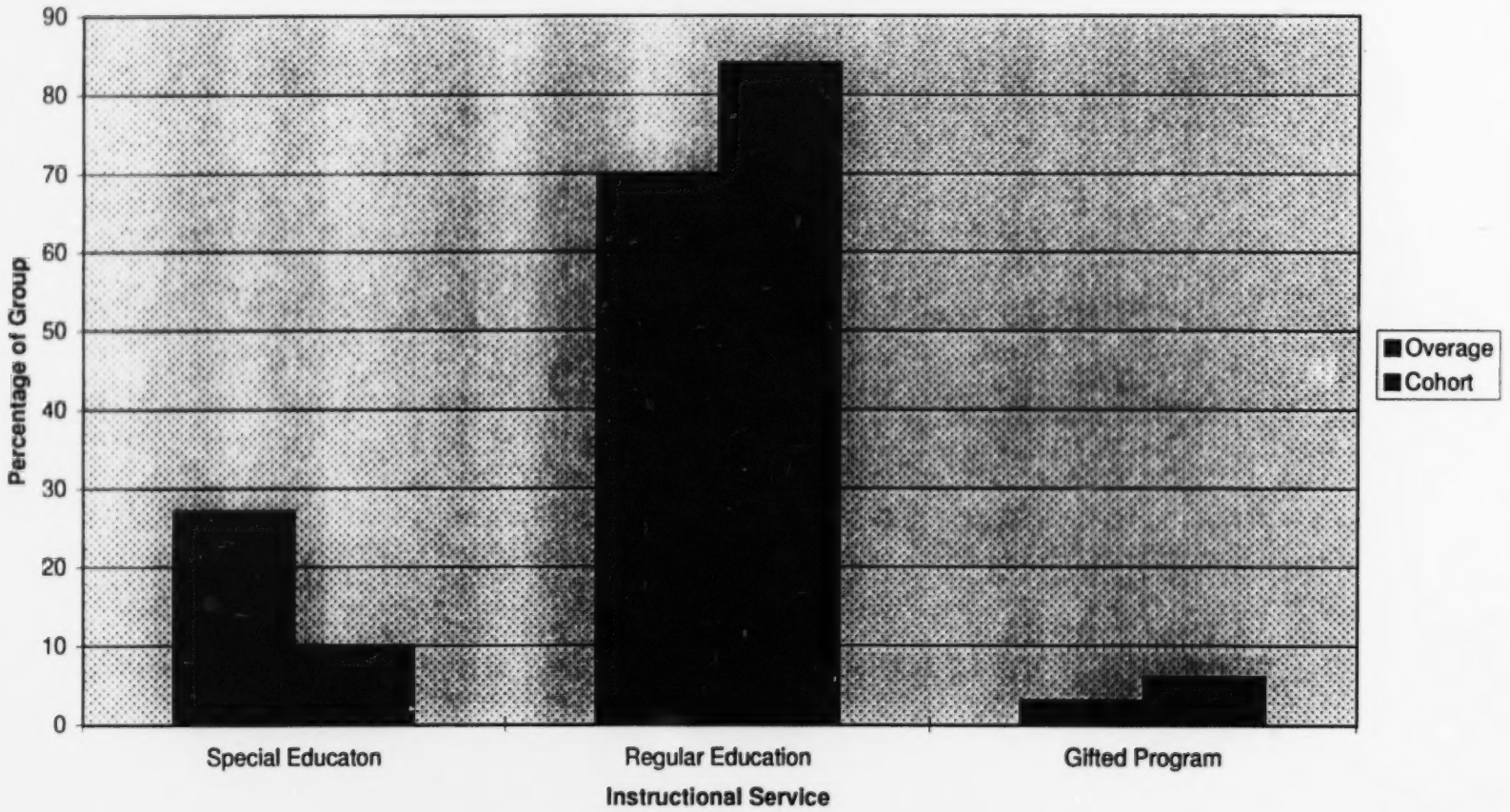
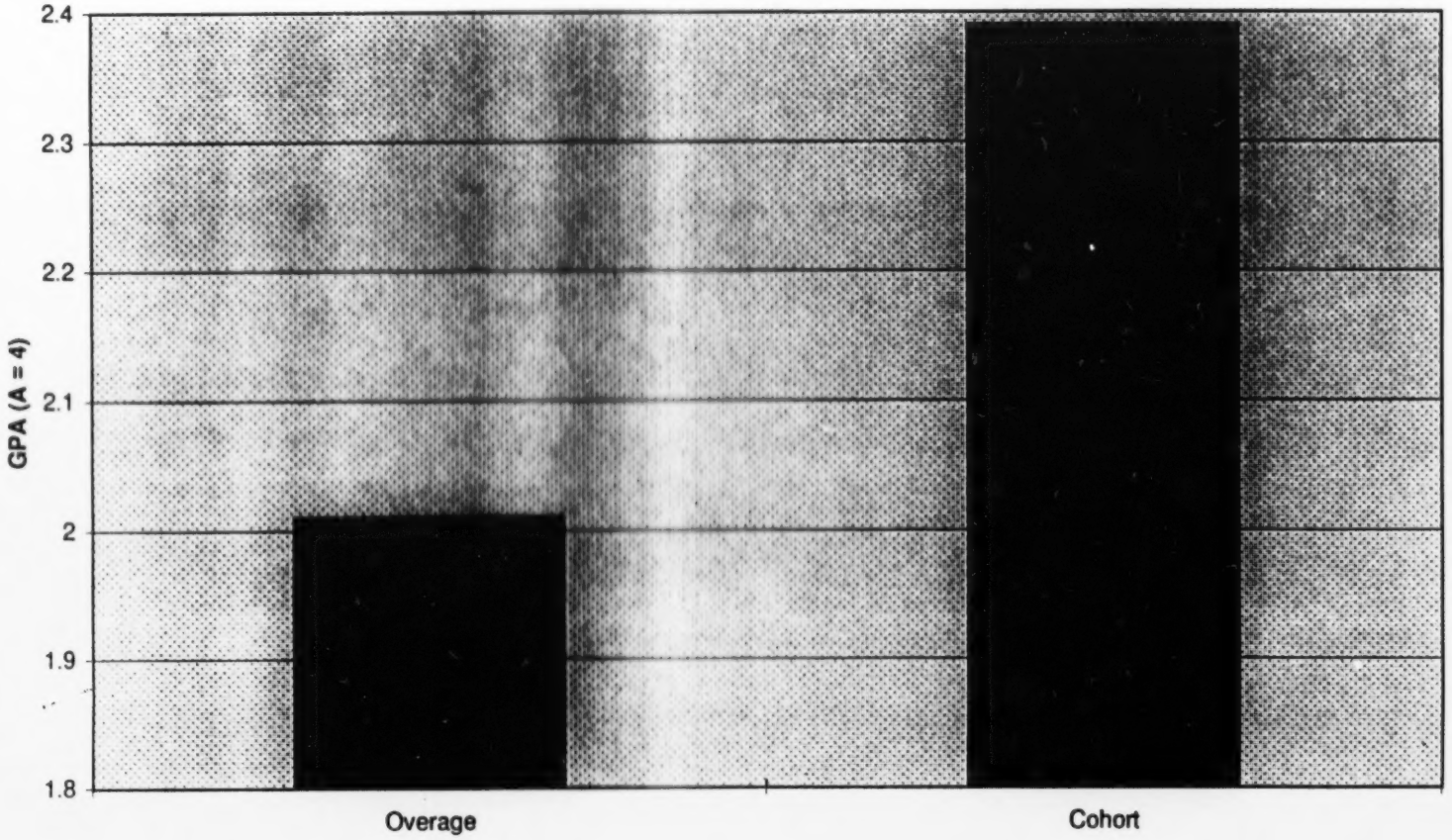


Chart1

Marks (Grade Point Averages) 7 Years after Starting Kindergarten



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